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PARKS

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Front cover: *This Norway Spruce* (Picea abies) *forest in Nationalpark Bayerischer Wald, Federal Republic of Germany, has been destroyed by a form of air pollution, commonly known as "acid rain." This is one of the most frequent and most important species, making up 50 percent of the great German forests. More than one-third of the nation's forests shows damage from acid rain, and the damage continues. National park personnel are making a major effort to inform and educate visitors about this unseen but ever-present danger.*

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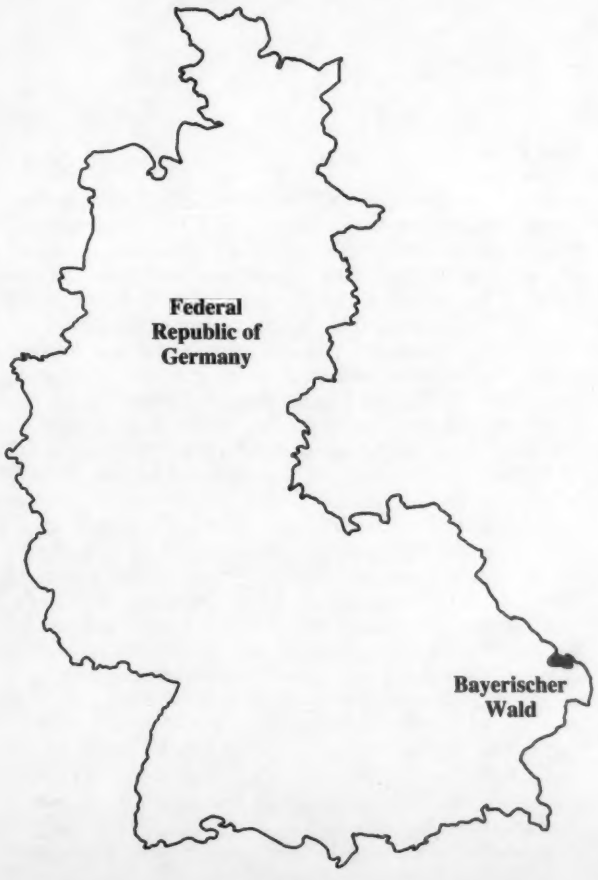
Dr. Hans Bibelriether

Bayerischer Wald National Park Threatened By Air Pollution

Bayerischer Wald (Bavarian Forest) National Park, established in 1970, was the first national park in the Federal Republic of Germany. This 13,000 ha (32,123 ac) park is situated between 700 and 1450 m (2,300-4,700 ft) above sea level along the German-Czechoslovakian border in Bavaria; it is 99 percent covered with mixed spruce-fir-beech forests, with only 200 ha (494 ac) of moorland.

Although there have been some changes through forest utilization, the area has remained in a relatively natural state compared with similar European regions. Because of this it has been possible for the management to establish strict reservations on about half of the park's area and thus prevent economically oriented interference by man. Therefore today the Bayerischer Wald is the largest conservation area in Central Europe where the forest is springing up, growing and dying in accordance with natural laws.



Interpretation

Interpretation as a particular form of education has no tradition in Germany. There is as yet no term in the German language for "interpretation of the environment." Although guided tours were begun in Bayerischer Wald as early as 1972, this was only a small part of the original management. Today, however, nature interpretation is one of the most essential tasks in the National Park. Article 8 of the Bavarian Nature Conservation Bill states: "National parks are to be made accessible to the population for purposes of education and recreation, protection intentions permitting."

The National Park is almost entirely wooded so the central effort is to promote understanding of the forest as a community of life, and insight into the multiple interrelations between the links of this complicated community as well as the interdependence of climate and soil.

The motto for the interpretation work in the National Park is: "Experience the forest—understand the nature." The idea is not simply to impart knowledge of species, but comprehension as well. Opinion surveys prove that visitors have a high interest in the forest, thus fulfilling our goals. In addition, more than 90 percent of the visitors are vacationers staying in Bayerischer Wald for an average of 12 days, giving them a chance to relax and learn in a leisurely manner, and giving the interpretation staff a chance to convey a better understanding of the forest and therefore a better understanding of nature itself.

The most effective interpretation is achieved by personal care in connection with various forms of (scientific) excursions relating to biology. Depending on the season the National Park offers visitors alternating programs on, for example, history of the forest and the earth (geology), primeval (virgin) forest, forest as a habitat for animals and plants, changes of the forest caused by man, etc. These topics are not strictly followed, however. The interest of the visitors is the main consideration, as are spontaneously arising situations.

Since walking is the favorite activity of park visitors, information signs are placed along walking tour routes where hikers would normally stop for a breather or to look at the scenery. This makes it easy for a visitor to learn more about his surroundings without forcing an unwanted interruption to his enjoyment.

National Park House combines traditional architcture with stimulating exhibits that both interest and inform the thousands of people who visit annually.

Photographs: Dr. Bibelriether.

Visitors have a clearer understanding of how acid rain has affected this Scotch pine (Pinus silvestris) *after they have seen the exhibit in the visitor center and heard the park interpretation staff pinpoint the damage.*

National Park House

The National Park House Visitor Center, which opened in 1982, is an important and central institution for the education and interpretation work in the National Park. It is a large visitor center serving two roles: (1) the central institution for coordinating all interpretation and education activities in the park, and (2) a significant regional tourism facility for the entire Bavarian forest. It serves as a diversified and popular destination for outings, especially during bad weather; more than 200,000 visitors registered during its first year of operation.

The generously designed entrance hall of the House contains a variety of seating accommodations, a five minute multi-vision slide show on the subject, "National Park — Why?" and a sales area. In addition there are large exhibit rooms, a library that also serves as a comfortable lounge, and an "experience room" particularly popular with families, where youngsters can learn about familiar natural objects. They realize the importance of size and shape and texture by testing their knowledge without using their eyes, for example — enclosed boxes with holes just large enough to admit their hands encourage children to identify the contents, such as a feather or bark of a tree or a bone, by touch alone. The surroundings of the House are designed as a botanic garden, offering visitors a chance to learn why certain kinds of plants grow together in a certain vicinity. It also provides information about geology and soils.

One of the most impressive displays in National Park House deals with the increasing threat air pollution—acid rain—poses to all European forests.

Acid Rain

In common with most of the European forests, Bayerischer Wald has been increasingly endangered by air pollution in recent years. Various species of trees are dying, not only in our park, but also in the Harz Mountains, Fichtel-Gebirge, and Black Forest of Germany, as well as the Giants Mountain and Ore Mountains in Czechoslovakia. Particularly affected are the Norway spruce *(Picea abies),* which is the most important and most frequent conifer (50 percent of the German forests); as well as the white pine *(Abies alba)* and the Scotch pine *(Pinus sylvestris).* An official government survey in the summer of 1983 showed that more than one-third of the nation's 7.5 million ha (18.5 million ac) forests show signs of disease. Within one year the area of affected forest has nearly tripled.

The National Park Administration has been making every effort to inform the public in every possible way about this problem, thus inducing responsible politicians to take countermeasures. More than 400,000 people have visited the exhibit on "Deadly Rain" since it opened in the National Park House at Bayerischer Wald in 1982. Staff members lead several guided tours daily on the subject of air pollution and the dying forests during the summer months; as a result more than 10,000 park visitors annually see examples of afflicted tree populations and the after-effects. They can see the thinning and yellowing of the forest canopy and touch the brittle and weakened needles. Other visitors notice the absence of trout in the high mountain streams of the park where the acidic rain falls most directly.

The exhibit "Deadly Rain" demonstrates in a striking and

straightforward way the problems of pollutants spreading in the air and their effect on water, soil, flora and fauna, and historic buildings. Starting point of the exhibit is the explanation of acid rain. By simple experiments it demonstrates where sulphur dioxide originates, for instance, how it gets into the air, how it diffuses and what damage it causes as it precipitates as acid rain, acid snow or acid fog. The damages are illustrated by examples within the National Park.

In addition, the exhibit establishes a world-wide connection, making clear that all the densely populated, highly developed industrial countries are affected. It demonstrates that heavy metals, for example cadmium and lead, can enter the food chain and ultimately threaten man himself. In the Federal Republic of Germany there are already certain regions where it is recommended that people not eat wild mushrooms or the entrails of red or roe deer.

While information is presented on possible remedial measures in the technological field, one of the important features teaches visitors how they can personally contribute to the reduction of the damages. At the end of the exhibition visitors can note their opinion about the menace to the forest, the reasons and the remedial measures shown. Suggestions are made for further reading on the subject as well. Several volumes have already been filled with visitors' comments. They reflect quite a critical opinion about some of the provisions of the laws concerning prevention of air pollution and generally for the conservation of the natural environment.

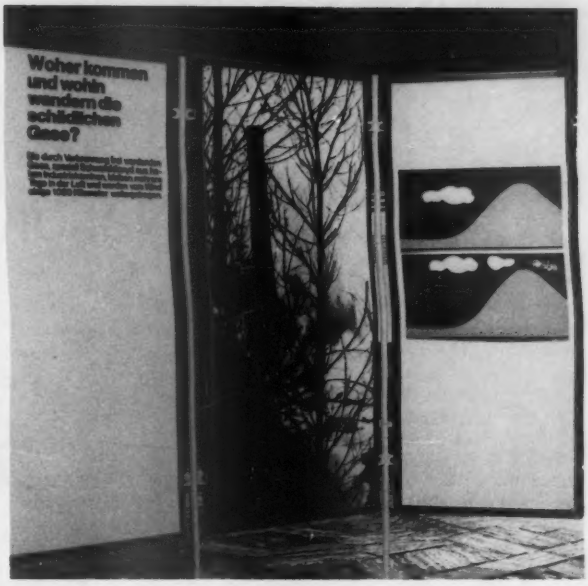
The direct hands-on involvement of the visitor is one reason for the effectiveness of this exhibit. There are a number of displays where the individual can perform a simple but scientific experiment; one of the most graphic is the use of small strips of litmus paper. The visitor stands before two containers of water, both crystal clear and seemingly identical. He picks up a strip of blue litmus paper and dips one end into one of the containers — the paper merely gets wet. He dips the other end into the next container and it promptly turns bright yellow. Perhaps for the first time that visitor realizes that appearances can be wrong, that water which looks pure and clean can be potentially dangerous, not only to his surroundings, but to himself. Now he can understand what happened to all those trout in the upper reaches of the streams — they cannot live with these invisible chemical contaminants.

Never before in history have the forests of central Europe been in such danger. Woods destroyed by forest fires, thunderstorms or heavy snows can be replaced by new growth springing up, either by natural rejuvenation or human replanting. But no trees will grow in those districts where the woods were eradicated by air pollution, because the soil has been heavily damaged as well. In mountainous regions the timber line will lower; the water balance will be disturbed; avalanches and erosion will increase. The consequences for the entire country are not yet known.

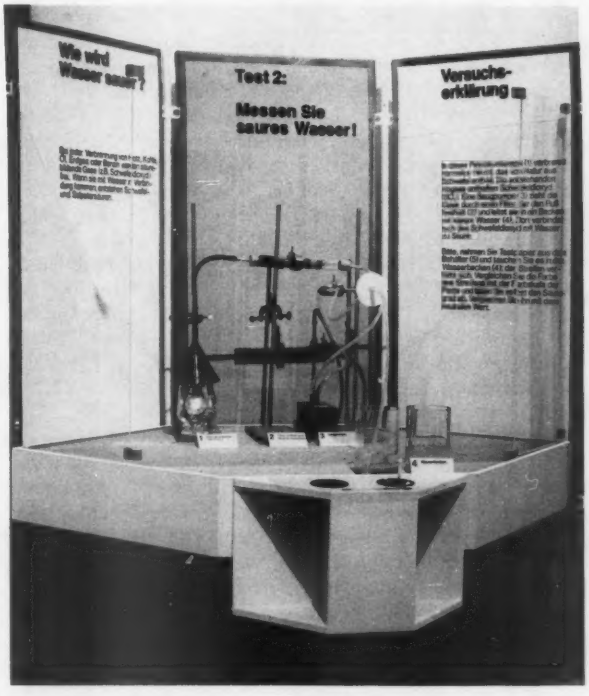
The exhibit at National Park House reaches out beyond the boundaries of Bayerischer Wald National Park to explain far reaching effects of national or international actions. We attempt to explain and graphically demonstrate the role of the individual, his government, his nation and his world.

Effective nature conservation requires understanding, communication and joint responsibility of the people. These can best be achieved by good interpretation. At Bayerischer Wald National Park we constantly work to involve our visitors, to incorporate them into the events, to make them concerned, to bring about real communication with them.

Dr. Hans Bibelriether is the Director of Nationalpark Bayerischer Wald and a member of the Commission on National Parks and Protected Areas of IUCN.



This exhibit shows clearly the difference that smokestack height can make. The stylized upper panel shows the acid exhaust blown directly to the forested -mountainside by the prevailing winds. The lower panel demonstrates how a higher stack allows the acidic exhausts to pass over the mountain, thereby causing less damage.



Vistors can perform simple scientific experiments to prove the unseen dangers of acid rain. Here small strips of litmus paper are provided to dip into acidic and non-acidic water in the two glass containers on the counter. The laboratory equipment and informational signs explain in clear language exactly what is happening in Bayerischer Wald and elsewhere.

Czesław Okołów

National Parks in Poland

The idea of a national park was born in Poland at the end of the 19th century, when the Tatra Lovers' Society proposed organizing a national park in the highest Polish mountains, but the first park was not in fact established until after World War I. In December 1921, part of Białowieża Primeval Forest was proclaimed as a forestry district preserve. This was in practice a national park; only the official nomenclature differed. In 1932 the forestry district preserve was renamed the National Park in Białowieża. Before World War II a second national park in the Pieniny Mountains was also created. After 1945 several more preservation areas were enlarged and designated as national parks.

Today in Poland there are 14 national parks covering 125,336 hectares (309,705 acres). This is only 0.38 percent of the whole country. The parks are distributed in different geographical provinces of Poland: in the Baltic coast area are the Woliński and Słowiński parks; in the Lakeland is Wielkopolski; in the extensive lowland area are Kampinoski and Białowieski; in the uplands are Roztoczański and Ojcowski; in the old mountains are Karkonski and Świętokrzyski, and in the young mountains Babiogórski, Tatrzański, Pieniński and Gorczański. The national parks Tatrzański, Karkonoski and Pieniński border national parks of the same names in Czechoslovakia. The Białowieski NP adjoins extensive preservation and hunting territories in the Soviet Union, which increases the effectiveness of the nature protection.

Three Polish parks — Słowiński, Babiogórski and Białowieski — were declared biosphere reserves in 1977 and, since 1979, the Białowieski NP has been included in the World List of Human Heritage. In addition to national parks, there are now 17 landscape parks with a total area of 828,789 ha (204,794 acres) and 809 nature preservations covering an area of 89,959 ha (22,289 acres).

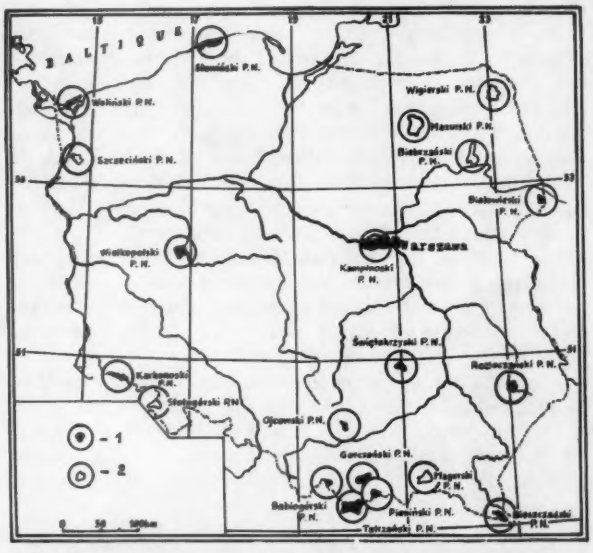
The land in all the national parks belongs to the state, except that in Tatrzański, Ojcowski, Babiogórski and Kampinoski parks there are some small private holdings. Protection of nature is under a special department of the Ministry of Forestry and Timber Industry and national parks management belongs strictly to this department. The financial needs of national parks come from the state budget. According to the Nature Protection Law, passed by the Parliament in 1949, the national park is the highest level of nature protection. Each national park is created on the decree of the Council of Ministers. The minimum size of a park is 500 ha (1,235 acres). The Ministry of Forestry and Timber Industry has an advisory body, the State Council of Nature Protection, which contains a special commission on national parks and nature preservation controlling the operation of the parks. Also the highest scientific authority, the Polish Academy of Science, has a special Committee for the Protection of Nature and Natural Resources.

Each park is managed by a director who is advised by the National Park Council. This Council contains mostly scientists but also has representatives of several organizations and local authorities which are interested in its work.

Primarily, national parks are created for the protection of nature but several Polish parks also have important historical associations (for example, Ojcowski, Świętokrzyski and Kampinoski) or folk culture associations (the mountain pastures of the Tatrzański National Park) or old forms of water traffic down the Dunajec River by rafts in the Pieniński National Park.

In the activities of national parks, the primary task is the preservation of natural or seminatural ecosystems, and their natural or seminatural components, together with ancient forms of land utilization and associated folk culture. The second function is to make the parks accessible for research, always provided that any work carried out does not alter the natural ecosystems. Tourism and teaching the young is their third function, but this field in some parks causes conflicts between nature protection and the needs of the visitors.

Depending on the character of each park and the degree to which nature has been undisturbed, preservation orders of varying



Distribution of national parks in Poland. (1) Existing national parks. (2) Proposed national parks.

Bieszczadzki National Park, looking from Krzemien peak toward Rozsypaniec peak. Photo: M. Ferchmin

strictness have been applied. The strictest of these bans any form of human alteration to the natural environment. In partially preserved areas human effort is permitted to manage the course of natural processes, primarily to progress toward more primeval conditions. For example, in several parks there are large areas of forests that have been artificially planted and that are managed with the objective of changing the structure of the environment. In the Kampinoski National Park, the afforestation of former agricultural land is being achieved. Due to the lack of large predators, in several parks it has become necessary to cull a limited number of ungulates by shooting. Other kinds of activity have been the restitution of plant and animal species which had disappeared, such as the yew and the European beaver.

All Polish national parks are used by scientific institutions such as the Polish Academy of Sciences, universities, high schools and research institutes. Also national parks employ their own scientific staff for research programs and for collecting scientific documentation about the park. In four parks, special research stations have been established and about forty different research programs are in progress at the moment.

All research carried out by national park staffs is coordinated by the Department of Nature Protection of the Forestry Research Institute. A special paper is issued twice a year called "Parki Narodowe i Rezerwaty Przyrody" (National Parks and Nature Reserves), which gives full descriptions of the results of investigations and also contains articles relating to the practice and theory of activities undertaken in the parks. Several parks (i.e. Białowieski, Ojcowski or Świętokrzyski) publish a bibliography containing all scientific and popular-scientific or journalistic articles about these parks.

Polish national parks play an important role as tourism centers and are visited by more than five million people yearly. In addition, the museums, which exist now in 10 parks, play an important role in instruction and nature interpretation.

Lake Kociolek in Wielkopolski National Park. This dystrophic lake is brownish with much dissolved humic matter, a sparse bottom fauna with a high oxygen consumption. Photo: M. Ferchmin

Perhaps the most important threats in Polish national parks is environmental pollution, mostly by air but also by water, from sources lying far from the borders of the parks. Investigation has revealed that the parks most affected are Karkonski, Ojcowski, Tatrzański, Świętokrzyski, Kampinoski and Gorczański. The second group of threats is connected with the influence of urbanization of towns located in areas surrounding the parks. This is

especially important in the Kampinoski and Wielkopolski national parks, which are situated near the capital city of Warsaw and the great industrial town of Poznań. The third group of threats is concerned with damage caused by an excessive number of visitors, and this affects nearly all the parks, even the more remote ones at Białowieski and Słowiński. In many parks the change in water conditions of groundwater and surface water is a serious threat.

In the work of Polish national parks an important role is played by several volunteer organizations, such as the League of Nature Protection, the Polish Ecological Club, and local associations in several provinces, such as the Association of Tatra Mountain Friends, which was started in 1983, and the Polish Tourist and Countrylovers Association (PTTK). This last is especially interested in nature protection at national and provincial levels. Representatives of PTTK attend all national parks councils and organize special projects such as "Clean the Tatra Mountains." In addition they train tourist guides.

Much assistance is given to national park staffs by the Nature Protection Guard, made up of volunteers from several organizations, such as the League of Nature Protection, PTTK, Polish Angling Associations and Polish Hunting Associations. Members of this Guard patrol routes during the tourist season and instruct visitors in the principles of nature conservation. In cases of infringement against nature protection regulations, they can punish offenders by fines or take them to court if necessary.

In conclusion, it must be said that the distribution and size of Polish national parks are far from perfect, as they do not represent all types of our landscapes and ecosystems. For this reason great attention is being given to the creation and management of buffer zones around the parks. Because there are no parks embracing such landscapes as the Great Masurian Lakes or the marshes along the beds of large rivers, the Committee for the Protection of Nature and Natural Resources of the Polish Academy of Sciences has prepared a plan of landscape protection. Accepted by the State Council of Nature Protection, this plan emphasizes the need to create by 1990 six new national parks (see attached map) to add new areas that should cover over 200,000 ha (494,200 ac). There is also a proposal to create more than 200 new nature preservation areas, as well as several landscape parks. In the near future a national park in the Biebrza Marshes will be delimited, containing the last European river bed surrounded by marshes undisturbed by man. Plans are being made to create other parks to contain Lake Wigry and part of the Masurian Lakeland.

Polish authorities are deeply conscious of the unique inheritance given them by nature and they are determined to play a full part in preserving this to the limits of their resources.

Dr. Czesław Okołów is Senior Scientist of Białowieża National Park

These migrating seashore sand dunes are a feature of Słowiński National Park along the Baltic Sea. Photo: M. Zielonko

Quartzite boulder field at Lysa Gora in Świętokrzyski National Park south of Warsaw. Photo: J. Siudowski

NATIONAL PARKS IN POLAND

Name	Year Established	Surface Area (Hectares)	
		Total	Under strict protection
1. Białowieski NP	1921	5,317	4,747
2. Pieniński NP	1932	2,330	587
3. Świętokrzyski NP	1950	5,878	1,741
4. Tatrzański NP	1954	21,164	10,514
5. Babiogórski NP	1954	1,728	1,061
6. Ojcowski NP	1956	1,590	344
7. Wielkopolski NP	1957	5,230	221
8. Karkonoski NP	1959	5,547	1,717
9. Kampinoski NP	1959	35,002	4,303
10. Woliński NP	1960	4,844	162
11. Słowiński NP	1966	18,247	3,576
12. Bieszczadzki NP	1973	5,726	2,087
13. Roztoczański NP	1974	6,824	518
14. Gorczański NP	1981	5,909	2,420

Arun Bhatacharjee

You Can't Fight That Weed, Can You?

Ever since its introduction to Asia and Africa, the water hyacinth has spread like wildfire, clogging canals, choking waterways and river dams. Believed to be a native of the Amazon Basin, *Eichhornia crassipes* was probably brought to Asia by a king of Thailand in 1905 as an ornamental plant. In Bengal, its staggering spread in forty years forced the British authorities to take emergency measures to clear nearly 1.5 million hectares (3.7 million acres).

Eight nations, spread over four continents, are cooperating to fight the menace, but so far all attempts to destroy it have failed in every country. Its innate toughness makes it difficult to control. Its seeds can survive almost 20 years and it can withstand the severest drought. A prolific producer, it doubles its biomass every eight days by vegetation propagation. One plant can produce several thousands in a season.

Its pernicious effects are varied and widespread. Apart from its damaging effect on dams, waterways and irrigation canals, it is helping to spread malaria and kill other aquatic flora and fauna by shutting out oxygen. In Bangladesh, cows grazing on the hyacinth, which contains 90 per cent water content, produce milk that is watered down by nearly 60 per cent.

In Sri Lanka, harassed health authorities have more than once ordered the manual removal of the water weed. Today, 25-40 per cent of the water area in India, 10 per cent of Sri Lanka, 20-25 per cent in Bangladesh and 16 per cent in Papua New Guinea is covered with it, and so are 60 out of 279 km² in Guyana. The beautiful violet, pink and white flowering water weed covers vast areas of lakes and rivers and is a common sight in Asia, Africa and South America. Experts say there is virtually no tropical or subtropical area that is not threatened.

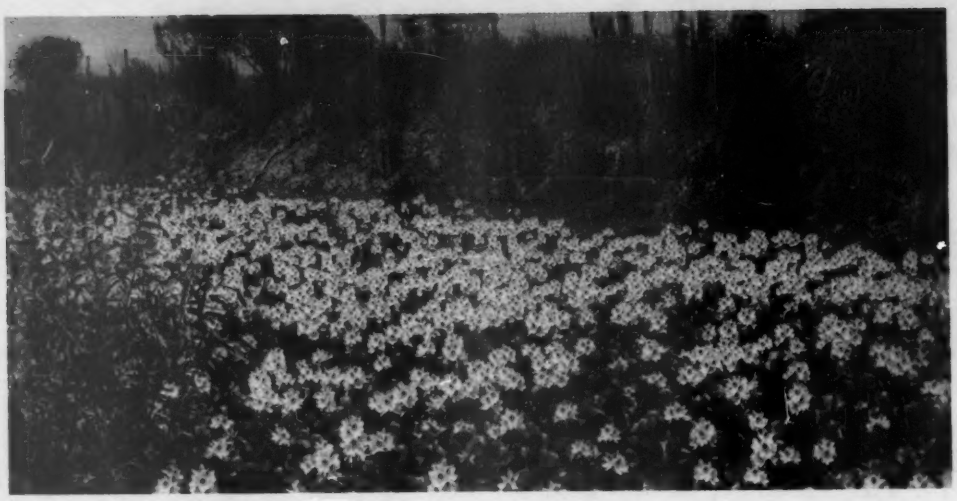
Total destruction was attempted in Lake Seminole in Florida in USA by herbicide treatment, but this only led to replacement by an even tougher weed, the *Alternanthera philoxeroides*. In other areas, replacement occurred by a plant called Southern Naiad. This is a process with which scientists are becoming familiar. If flora and fauna in an ecosystem are destroyed, more persistent forms often succeed them.

Nations which have tried chemical eradication agree to the high cost of the operation, and subsequent chemical contamination of the water system is often serious. Spraying Fernoxone on 329 acres of water hyacinth in the renowned Ghana Bird Sanctuary in Bharatpur cost the government $2,500. In 1975, Sudan reported spending $3 million annually for spraying 500 tons of herbicide. Mechanical controls are also expensive. One mechanical control raft costs somewhere between $700 and $7,000 depending on the capacity. The cost in one developing country came to $18 to $20 per hectare in 1976, and in the USA it was around $30 to $60 per ton of dry matter.

The lovely violet blossom of the water hyacinth belies the extensive ecological damage it can cause. In America the spread of this water-clogging plant has been accelerated by unsuspecting tourists who have taken home a plant or two for their own enjoyment. These plants are often deliberately placed or discarded in local streams or lakes by those who have no idea of its propagating prowess.

This effectively narrows down the scientists' choice to biological control requiring extensive study of the ecological effects of introducing exotic herbivorous fauna or insects. Three institutes in UK, Australia and Trinidad are currently studying this aspect.

Two plants are known to have serious biological effects on water hyacinth. The USA, Australia, Fiji, Zambia, Zumbabwe,



Blooming water hyacinths completely choke this small waterway in southern Florida, effectively blocking the passage of even the smallest boats.

South Africa and Indonesia are growing them under controlled conditions. India has refused to introduce them without first ascertaining the long-term effect on the ecology. Efforts have been made to use herbivorous marine mammals such as the manatee *(Trichechus manatus),* but many nations hesitate to try this, doubtless for good reasons.

However, since governments have so far failed to destroy it by any known methods, scientists are taking a second look, adopting the age-old philosophy, "if you can't beat it, live with it."

Instead of dismissing it as an environmental nuisance, scientists are examining the water weed for its potential properties. Experiments in several countries have produced spectacular results. For instance, scientists have found that water hyacinth can clean up metals from sewer water and can purify waste waters from tanneries and rubber production plants.

In one experiment, water hyacinth in contaminated water removed 77 per cent of the lead in 24 hours and proved its ability to absorb heavy metals like cadmium, nickel, chromium, zinc, copper and iron.

In Madras, where tannery effluents were destroying groundwater resources, the Central Leather Research Institute of India used water hyacinth successfully on working models to clean the effluents. The Standards and Industrial Research Institute (SIRI) is using water hyacinth plants in Malaysia for the treatment of waste water from sugar refineries. Together with the Rubber Research Institute of Malaysia, the SIRI is experimenting with the treatment of rubber processing effluents by water hyacinth. Water thus treated is then used for agriculture and the vegetables grown are analyzed for any residual toxicity.

A use has also been found for the hyacinth as a fertilizer. Its ashes contain 30 per cent potash, 7 per cent phosphoric acid and 13 per cent lime. In the sandy infertile soil of the Sudan, for instance, the use of this ash as a fertilizer has increased production of groundnuts by 31 per cent.

The hyacinth has possibilities as a soil conditioner and has a nitrogen-fixing capacity which is twice as high as town composts. The Jorhat Institute believes that India could get 5 million tons of compost from water hyacinth with an equivalent value of over 10,000 tons of nitrogen, 55,000 tons of phosphate and 125 tons of potash or equal to 525,000 tons of ammmonium sulphate valued at current prices at more than a million dollars.

However, one of the most promising uses of the water hyacinth is in the manufacture of cooking gas which contains about 60 per cent methane. Up to 40 litres of gas can be produced per kilogram of dry weight hyacinth (90 kgs of fresh weight). The next step may be bottling and transportation of the gas from a major processing plant.

There are other possibilities. Scientists have found that water hyacinth contains 26 per cent carbohydrate by weight. It can be used as animal or poultry feed, and may be used for the extraction of biological compounds such as enzymes, vitamins, coenzymes, plant hormones, insect attractant and repellant and organic acids.

In Hyderabad, experiments are under way to produce hyacinth cement boards. With world-wide condemnation of asbestos as a health hazard and its ensuing production cutback, hyacinth cement boards could prove a major contribution to roofing materials.

In Assam, Dr. Gopalakrishna Thyagarajan, Chief Coordinator of the Water Hyacinth Project and Director of the Jorhat Institute of the Council of Scientific and Industrial Research, says: "Today, we have a lot of information on the water hyacinth and we are confident of our ability to control it, although total eradication may not be advisable."

The hyacinth project at the Institute drew international support at a workshop in Dacca, Bangladesh, five years ago, when a multichannel research project was proposed. Extolling the virtues of the long-condemned water weed, Dr. Thyagarajan said: "In terms of conversion of solar energy into biomass, water hyacinth ranks higher than sugar cane and next only to green algae. It has 17 per cent protein and can be used as fodder, while its stem contains 35 per cent cellulose and has fibers whose quality is identical to asbestos and papermaking bamboo."

Dr. Thyagarajan claims that the manufacture of paper from water hyacinth has added a new dimension to the research of this plant. Scientists at the Institute have made paper and paper-board, and have erected a pilot plant to produce 50 kilograms of finished paper daily.

He calls this a "model for the job-oriented rural industry" where each factory can employ around 15 people to produce paper that can be used for documentation, special stationery, invitation and visiting cards.

"If we can turn this pest into a provider without affecting the environment we have achieved a lot, and will have solved a problem that has worried scientists and planners for the last 50 years," says Dr. Thyagarajan.

(Courtesy: Ecoforum; Vol. 8, No. 1)

(Reprinted from World Wildlife Fund—India, Newsletter #46, 3rd quarter, 1983.)

Photographs: South Florida Water Management District, USA

IUCN General Assembly Will Meet In Spain in November

"Partnership in Conservation: Toward a World Conservation Plan" is the theme of the 16th General Assembly of the IUCN being held in Madrid, Spain, Nov. 4-14 at the Palacio Exposiciones y Congresos. The Assembly will be preceded by meetings of all the IUCN Commissions on Nov. 3 and 4.

The format of the General Assembly meeting, which is a comprehensive review of IUCN activities, has been designed to provide dialogue among the participants and to build cooperation between the Secretariat and the IUCN membership.

Following the meetings, field trips will visit several of Spain's natural areas, including Doñana National Park, giving participants an opportunity to explore some of the protected areas of the Iberian peninsula.

Participation in the General Assembly is limited to IUCN members; however, Commission members are welcome to attend the Assembly meetings as observers, and the Commission meetings as full participants.

Formal invitations are required to attend the General Assembly. These can be requested through:

Secretary General, IUCN
Av. du Mont-Blanc
1196 Gland, Switzerland

A problem in Doñana National Park, as elsewhere, is the introduction of exotic species. Animal exotics include fallow deer (as pictured), feral cattle, wild boar, wild horses, and a few camels. Except for the deer, these animal problems are not severe, since most have been here 600 to 700 years and have established nitches. Major plant introduction is the eucalyptus.

This olive tree located in the village of El Rocio just outside Doñana, is claimed to be the oldest living olive tree in all of Spain.

B. A. Coburn

Sagarmatha: Managing a Himalayan World Heritage Site

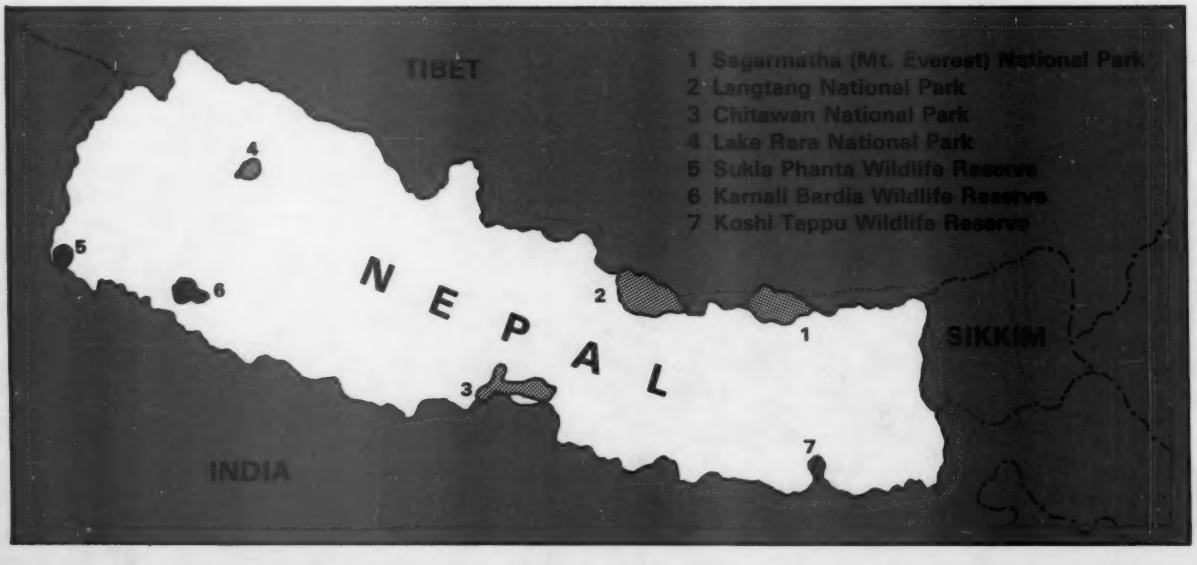
Within the boundaries of Nepal's Sagarmatha National Park rise some of the highest peaks in the world, including Mount Everest. The area which had remained protected by its remoteness has been affected recently by unforeseen human impacts including the yearly visit of some 5,000 tourists, who come for climbing and trekking. The most visible sign of these impacts on this fragile alpine environment is the lack of trees within a one-to-three-kilometre radius of each village; but many traditional pasture lands are deteriorating as well, and there are increasing problems of erosion and destabilized slopes. In 1980, Unesco, acting upon a proposal from the Nepalese Government, designated Sagarmatha National Park as a World Heritage Site under the World Heritage Convention, with the aim of helping to protect its unique natural and cultural features. In addition, a request for support from the World Heritage Fund was approved. This article stresses measures for restoring forests and providing alternatives to firewood. It gives an example of how a country can benefit from the World Heritage Convention. It suggests management techniques which could be applied in other parts of Nepal as well as in a number of countries suffering from similar problems of erosion and deforestation because of rural energy requirements.

Nepal is a landlocked mountain kingdom, a landscape of incredible geographic diversity that stretches from the Gangetic plain of India through the Mahabharat and Siwalik ranges to the central range of the Himalayas. This topographic variety is matched by a wealth of cultural diversity: over a score of ethnic groups of distinct traditions and languages coexist here. Until 1951, when the country opened up its borders for the first time, the complementary barriers of topography and isolationist political policy insulated Nepal from most of the rest of the world. Since then, population growth, immigration from the north and south, tourism and changing lifestyles and modes of production have placed increasing stress on the country's limited resources.

Deforestation and agriculture expanding on to marginal lands are twin culprits in the acceleration of erosion, providing what Erik Eckholm has termed the country's leading export: soil.

An unstable environment

The Himalayas are geologically young mountains, the result of tectonic uplift caused by the collision of the Gondwanaland conti-



Nepali stonemasons constructed this streamflow measuring canal which directs the flow of water through a notched weir before cascading down the hillside. Photo: B.A. Coburn.

nent with the continent of Asia. Some of the rivers that flow from them, which join the Ganges and Brahmaputra, predate the uplift of the range and have maintained their courses as the mountains rose, creating extraordinary vertical relief. Glaciers have rounded the upper valleys of the major rivers, which cut through old glacial deposits reworked with old glacial debris.

Sagarmatha National Park's 1,243 square kilometres include the catchment basins of the Dudh Kosi, the Bote Kosi and Imja Khola rivers, which drain the slopes of Sagarmatha and other 6,000 metre peaks. Evidence of the erosive capacity of these streams and the agitation of a landscape still in motion are readily visible throughout the park. Flooding rockfall, debris flow and avalanches are events that have left their mark on the mountains of the park and in the memories of its inhabitants. These events are often triggered by the monsoon rainfall, which brings 80 per cent of the area's precipitation and swells rivers to many times their winter size. This accelerated geomorphological activity, combined with intense insolation, diurnal and and seasonal temperature variability and thin air, has shaped the vegetation and influenced cultural adaptations; it has also hampered the planning of large scale civil-development works such as roads and hydroelectric projects.

The Khumbu area in which lies Sagarmatha National Park was first settled by Sherpas moving westward from Tibet about 450 years ago. The subsistence practices they developed based on an agro-pastoralist trading economy utilized the agricultural opportunities provided by altitudinal gradient and capitalized on the region's intermediary location between Tibet and the Indian subcontinent. Hardy grains, greens and potatoes (introduced by the European settlers in Darjeeling in the mid-nineteenth century) formed the mainstay of their diet.

Survival strategies

Subsistence strategies tailored to the constraints and opportunities peculiar to the Everest region have permitted the Sherpas to thrive in an environment of inherently low productivity and high variability and risk. Social and religious institutions regulating resource use have mitigated some of the environmental disruption concommittant with human settlements.

Yak and yak/cattle crossbreeds, important symbols of wealth, act as draft and pack animals and yield dairy products, hair, hides, fertilizer, fuel, meat and calves for trade. Yak management involves seasonal migration of the animals and their tenders from low to high elevations, in response to the availability of pasture. The timing of livestock movements is co-ordinated by an elected village committee of guardians, or *naua*. The *naua* sets opening dates when livestock will be allowed to graze on particular high summer pastures, and levies fines for infractions.

The total number of large animals (about 3,000) remained approximately the same between 1957 and 1978, but both the ownership structure and the relative proportions of cattle types has changed. More residents now have smaller herds, and the earlier preference for *naks* (female yaks) over *dzum* (crossbred cows) has reversed. Stockmen now depend more heavily on purchased feed and pasturelands adjacent to each village, where overgrazing is a growing problem. Large-scale stock-owners have also changed their stock-management strategies. Young men and boys, generally herdsmen before the advent of tourism, are now attracted to the trekking business, and livestock as a result is less widely dispersed. Increased demand for dairy products and the tourism-generated affluence of many Khumbu Sherpas may have triggered these changes.

Forest composition and production in the Khumbu is linked closely to slope and aspect. Birch is dominant on north-facing slopes at about 3,000 metres, juniper on drier south-facing slopes and hemlock, fir and pine are found at lower elevations. Deforestation in Sagarmatha National Park has generated considerable concern among park planners, and a number of studies have been directed at the nature and extent of the problem, and possible solutions.

The forests of Khumbu provide the Sherpas with timber for house construction, roof shakes, litter for latrines, animal bedding, some animal feed and medicinal, ritual and culinary herbs. More than all of these combined, fire for cooking and heating is the largest consumer of wood. Each Sherpa hearth burns over 5,000 kilograms of wood each year. Additional fuelwood is required for ceremonies and cremations. The local demand for firewood has little more than kept pace with the gradually increasing population of the Khumbu. Tourist fuel wood demands, however, have grown much more quickly.

This panorama view shows Sagarmatha (Everest) at the extreme left, Lhoste and Ama Dablam. A park game scout is resting on the trail in the center of the picture. Photo: D. L. Golobitsh.

Trekkers and refugees

The impact of tourists (tourism is Nepal's primary source of foreign exchange) visiting Sagarmatha National Park has been of annually increasing severity. Tourism in the Khumbu began with the first mountaineering expeditions in the 1950s, by 1982 more than 5,000 visitors entered the park through the Djorsaale entrance station. The trekkers have contributed considerably to the incomes of enterprising Khumbu residents, and to a certain extent tourism for the Sherpas fills the place that trade with Tibet occupied in an earlier day.

A typical climbing expedition lasting two months and burning four loads of wood per day can consume upward of 8,000 kilograms of firewood. During peak periods of trekking (October-December and March-May), an average of two groups per day enter the park. Prior to the introduction of firewood-burning restrictions, each group was estimated to burn a total of 28 loads. The sale of firewood to tourists was a lucrative business along the trail from Lukla to Everest base camp, worth nearly $16,000 a year to Pangboche residents alone according to one villager. In 1980, the National Parks and Wildlife Conservation Department of the Government of Nepal banned the sale of firewood to trekking groups, and the burning of outdoor fires in all the high-altitude national parks. Trekking groups are now required, upon entering the park, to carry a quantity of kerosene sufficient for the duration of their stay. A kerosene depot was recently established at the Sagarmatha National Park entrance. But this has been recognized by many as a stop-gap measure, and difficulty has been encountered in enforcing the regulations on small scattered trekking groups.

Historically, Khumbu's forest and grazing lands were most severely stressed following China's assumption of control in Tibet in 1959. Waves of refugees fled Tibet, crossing the Nangpa La and other high passes with their livestock, passing through — some settling in — Khumbu. In Tibet, trees were scarce; the unaccustomed abundance of Khumbu's forests prompted a lavish use of local forest resources that scandalized resident Sherpas, who found their regulatory institutions largely disregarded. In the memory of one Khumjung stockman, before the migration from Tibet there was more than enough grass for all the cattle, but the extensive bands of sheep and other livestock brought from the far side of the Himalayas "ate the grass to the ground," especially in the Thame valley. Starvation and disease eventually decimated those animals, along with Sherpas' herds, though they have recovered enough to sustain some numbers at the carrying capacity of the pasturage. The pastures and forests have not fully recovered.

The threat posed by intensifying land-use practices provided part of the incentive for the establishment of Sagarmatha National Park. The park developed out of a proposal compiled through the collaboration of an FAO wildlife officer, the Nepal Government and the Government of New Zealand.

Managing change in a national park

Reforestation was a primary focus of early park-management efforts. New Zealand foresters and National Parks staff established two nurseries at Namche and Trashinga, which continue to supply pine and fir seedlings for each summer planting. Park regulations prohibit the introduction of fast-growing exotic species, but there are a number of foresters who feel that exotics might significantly improve production. In 1980 the villagers of Namche, Khunde and Khumjung were provided with seedlings to plant. The survival rate of these trees has not been very high, but there is general popular support for park reforestation activities. A major impediment to the regeneration of unfenced plantings is livestock, particularly goats and sheep, which will browse on seedlings less than eight years old. The National Parks administration and the township governments are currently proposing to purchase the remaining goats and sheep, and thereafter prohibit their ownership in the park. Unfortunately, their owners are generally from among the lower echelons of Sherpa society, and may suffer economic privations from this action. Fenced plantations have been established by the Himalayan Trust, and the World Heritage technical co-operation project, started in 1981, has supported the construction of stone enclosures.

In addition to reforestation, regulations restricting the collection of green wood, and control of the locations where wood can be cut have been instituted. Stemming from recognition of local villagers' familiarity with the Khumbu forests and the importance of their participation in conservation efforts, measures are now being taken to reinstate the *shinga naua,* the indigenous village fire-wood-resources management committee, which was discontinued after the forests were nationalized in 1957.

In spite of the large total volume of firewood consumed, and the harsh climate, park residents are remarkably sparing with their use of wood, generally building small fires and extinguishing them after use. Thus, further attempts at reducing the amounts burned have been largely unsuccessful. Most stove modifications reduce the quantity of radiant heat that is available to the occupants and airtight stoves allow the inefficient combustion of green wood.

Because of the World Heritage technical cooperation project, efforts are underway to test out and introduce alternative sources of energy for cooking, heating and lighting. Solar cooking technologies suffer from restrictions of cooking time, inconvenience, inefficiency when cooking large amounts and the belief that food cooked out of doors can be infected by witches' spells. Solar waterheaters, however, have been economical for houses that use large quantities of hot water. Auxiliary "wetback" waterheaters — flat metal water-tanks buried in the backs of traditional hearths—have proved to be even more popular than solar heaters. For those installations where the owners have had to pay cash for firewood, solar water-heaters have been distinctly cost effective.

For isolated locations such as Sagarmatha National Park, where the labour costs are relatively low, high-head mini- and micro-hydroelectric plants (less than 100 kilowatts) can compete economically with large river schemes, which would normally benefit from economies of scale. The Unesco World Heritage Fund is currently assisting the construction of a 33 kW micro-hydroelectric facility near Namche Bazaar to provide lighting (night-time only) to 110 houses and cooking (day-time only) to 10 lodges. In the short term, an estimated one tree per day will be saved from being used for firewood. Electrical transmission and distribution is entirely underground in order not to affect the architectural integrity of the village.

It is clear that a combination of reforestation, control of local resource use, alternative-energy technologies and other well-planned, environmentally sound forms of park-management activities will be necessary to preserve the unique ecological and cultural heritage of Sagarmatha National Park. As this example in Nepal demonstrates, conserving and safeguarding World Heritage sites is a multi-dimensional commitment. Nevertheless, a small amount of support from the World Heritage Fund can provide long-term benefits.

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B. A. Coburn, a Unesco consultant, is advisor on alternate energy to the National Parks and Wildlife Conservation Department, Kingdom of Nepal.

Extracted from Unesco's Nature and Resources, *July-September 1983.*

Mingma Norbu

Cultural Preservation in Sagarmatha

Sagarmatha National Park has become almost as famous for the "living culture" of its native inhabitants, the Sherpas, as for its big mountains. The people and the mountains are inextricably linked in the minds of nearly every Park visitor.

Probably more than any other National Park, Sagarmatha must give a high degree of consideration to the approximately 3,500 local Sherpas and others who live within the 1,243 k^2 (480 sq. mi) of the Park. Originating in Tibet, they came to settle in the area in the late 15th century AD. Their lives are interwoven with the teachings of Buddhism. The religious festival held in the monasteries coincides with the major events of the agricultural calendar and reinforces religious beliefs and practices which are economically sound.

The Sherpa people (who speak a distinct Tibetan dialect) are famous for their ability to adapt to the harsh Himalayan environment. Their fame has spread along with the increasing interest in mountaineering and the international efforts to scale Mt. Everest. Although their economy has become increasing dependent upon tourism, the Sherpa people reserve their traditional values and social organizations. Traditionally, the Sherpa community has been based on agriculture, primarily potatoes, buckwheat and barley, and trade with Tibet.

Since gazettement in 1976, Sagarmatha Park management objectives have been to safeguard the Park's unique flora, fauna, cultural, physical and scientific values. A Unesco project includes assistance in restoring the weathered monasteries of Gompas and other old sites. These monasteries, religious and social centres of the village, have been heavily water-damaged, and many religious relics and precious books have been ruined.

Park conservation measures which stopped hunting and poaching in the area have resulted in an increase of the wildlife population. Today visitors can come across the wandering stock of Himalayan tahr, seros, muskdeer, and many species of birds, including Impeyan pheasant, blood pheasant, red billed chough, yellow billed chough, snow pigeon and Tibetan snow cock. The main habitats of these wildlife species are in the forests of blue pine and hemlock at lower altitudes through fir, juniper, birch and rhododendron woods to scrub and alpine plant communities at high altitudes.

Because of seasonal weather conditions, the 5,000 annual visitors come to Sagarmatha during the months of October, November, March, April and May. This concentration, plus the fact that each visitor in an organized group requires two supporting staff to serve as guides and carry loads, results in an unusually high impact on the area. Park management must be very sensitive to these potentially adverse effects.

(Mingma Norbu is a warden (park manager) in Sagarmatha National Park.)

Tengboche Monastery, situated at an altitude of 3,867 m (12,688 ft) above sea level, surrounded by the monks' quarters, is the most important religious and social centre of Khumbu in Sagarmatha Park.

H.K. Eidsvik

Remove the Myth — Build the Reality

(The following is a summary of a paper presented by CNPPA Chairman H.K. Eidsvik at the Congress on Biosphere Reserves held in Minsk, Russia, in 1983.)

During the past two days, we have heard from many highly qualified scientists about the values of Biosphere Reserves, their criteria for establishment and their value to society. This is but one essential foundation for the program. Technically speaking, I am not a scientist; I am a planner, a manager of programs, a policy adviser and a bureaucrat. All this makes me a pragmatist, seeking ways to improve the effectiveness of the Biosphere Reserve Program.

The program does not yet rest on a solid foundation. To quote Dr. Michel Batisse (Assistant Director General, UNESCO) on Biosphere Reserves, "few people know what it really means and many have confused and even conflicting ideas about what it is." Next, I quote Dr. Francesco diCastri (former Secretary, MAB Program): "among the field projects:

"30 percent would have existed without MAB [Man and the Biosphere]; 60 percent have been influenced by MAB; 10 percent owe their existence to MAB."

Finally, I note Dr. Kenton Miller (IUCN Director General) remark that 82 percent of all Biosphere Reserves are labels for other forms of protected areas and only 1.6 percent of the total area represents a new form of protected areas.

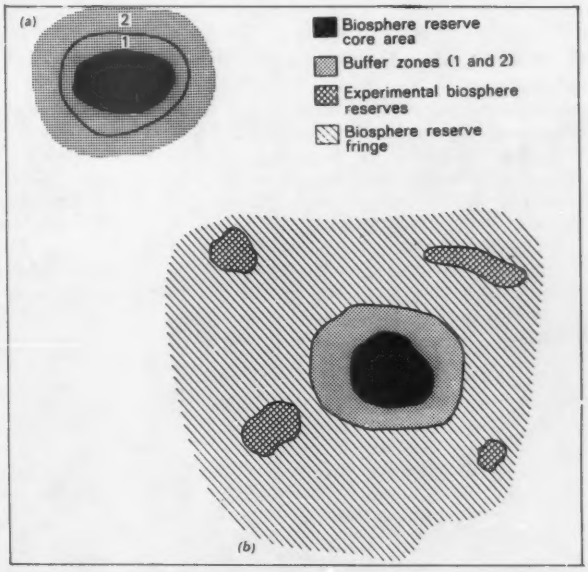
I am convinced that the program has value as a part of the family of protected areas. We must work to ensure the public understands this and that governments will respond by providing technical and financial support for Biosphere Reserves. To help this, I have a few suggestions:

My first is that we recognize what North Americans call "truth in advertising":

the current Biosphere Reserve criteria state that "some Biosphere Reserves coincide with other protected areas"; currently this means 82 percent of Biosphere Reserves. There is nothing improper in revising the criteria to say that Biosphere Reserves will *frequently* coincide with other areas. This will remove a minor irritation and, I suggest, a mental barrier to their establishment.

Secondly, we must review the 226 Biosphere Reserves which have been established. In today's theory some of these are "core" areas—they look at nature only within their boundaries or "inside the fence." Unless these reserves move in the direction of integrated management involving adjacent lands and communities they should be deleted from the system. To have a long list of areas that do not meet criteria leads to confusion and results in the downgrading of the entire system. In brief, I am advocating an apolitical peer group review of existing reserves and the creation of a similar review to provide technical advice to the Bureau of the MAB and International Coordinating Committee prior to the establishment of new areas. Such procedures exist and have worked well for World Heritage Sites.

Next we require improved criteria for reporting on research. The current system as noted by Dr. diCastri is not producing the data required for consistency in review or for evaluation of the investment of scarce dollars and manpower. Such a review could be carried out in conjunction with the evaluation of criteria suggested by Dr. Craig McFarland Wild Lands Management Unit, CATIE).



(a) Generalised biosphere reserve showing the theoretical core and buffer zone concept.
(b) Diagrammatic representation of a biosphere reserve cluster which includes geographically separate reserves which can provide the opportunity for controlled manipulations while also better representing regional variability.

Illustration courtesy IUCN

Having made those rather critical remarks about current practices, I would like to make it clear that I am convinced that there is a role for Biosphere Reserves in protected area systems. In many ways Biosphere Reserves are pioneering what I would refer to as the new wave in conservation — integrated area management, which preserves and protects the values of a core area while ensuring that cross boundary or frontier impacts are considered.

Where national parks form the core area of Biosphere Reserves, they must remain sacrosanct. The World Conservation Strategy recommends conservation with development and this is clearly the role of Biosphere Reserves. The national parks must remain as the conservation element of this program. By doing so, they can contribute to the development element.

No conservation and development program can exist without financial commitment. In many cases the Biosphere Reserve Program does not have this commitment; this is the case in my country and I am sure it is similar in many others. I suggest that we need to do a better job of communicating the development contribution of Biosphere Reserves to our governments, and in the developing nations we must link bilateral development agencies with Biosphere Reserve Programs.

Finally, it is clear to me that Unesco's commitment to the program is totally inadequate. The program has a highly capable and dedicated staff — unfortunately, they are too few in number and they have not been given the resources to direct the program. In this respect, we must direct our national delegations to Unesco's General Conference to strengthen the commitment to Biosphere Reserves. Or more drastically, the program needs to find a new home where nature is not totally dominated by cultural concerns.

In conclusion, the Biosphere Reserve Program at 10 years of age is a NEW program. To grow old and healthy it requires:

1. A re-evaluation of criteria and objectives.
2. A peer-group assessment process for existing and proposed reserves.
3. A sound financial base.
4. A commitment from Unesco.

I would like to suggest that these points relate to our expected outputs. We cannot achieve them in three days, but they must be done and the report should go to the General Conference of Unesco, as well as to the staff.

PARK TECHNIQUES

The Wildlife Observation Hide

Malcolm Charles Fisher

A wildlife observation hide must screen, as inconspicuously as possible, the person who seeks close access to wildlife. It usually is rectangular, with observation slits, and is built of natural materials, not only to integrate it into the environment, but also to ensure that wildlife will soon come to accept the new edifice.

The hide not only can provide closer views of the fauna, but—along with the access trails—can unobtrusively restrict visitor movement within desired areas and thus reduce habitat damage.

In areas similar to the United Kingdom wood is the cheapest material to use. The frame of the structure may be of any convenient size, connected with steel plates or cleats and covered with feather-edged boarding. The roof covering can be economically achieved using lightweight durable corrugated metal sheets.

Construction

Erecting a hide is relatively simple, and can use one of two methods: *platform* or *balloon*.

To use the *balloon* method, continuous timber stanchions are set in place in the foundations and then the frame and siding is hung from the stanchions (drawing LS/1).

The *platform* method uses only short main stanchions up to the underside of the floor timbers, with the floor built up from these and the rest of the superstructure erected from the floor (drawing LS/2)

The major disadvantage of platform construction is that the discontinuous stanchions cannot transfer the loads to the foundations as effectively as one-length stanchions used in the balloon method. Balloon construction, however, means that all floor, roof and subframe timbers must be cut to length with a high degree of accuracy to fit between the stanchions. Platform construction avoids this, and accuracy needed here, may be as low as + or − 25 mm (1 in) each end, thus permitting the use of unskilled or voluntary labour for construction.

Because hides are usually situated on soils of poor quality (such as sand or silt), The Royal Society for the Protection of Birds has devel-

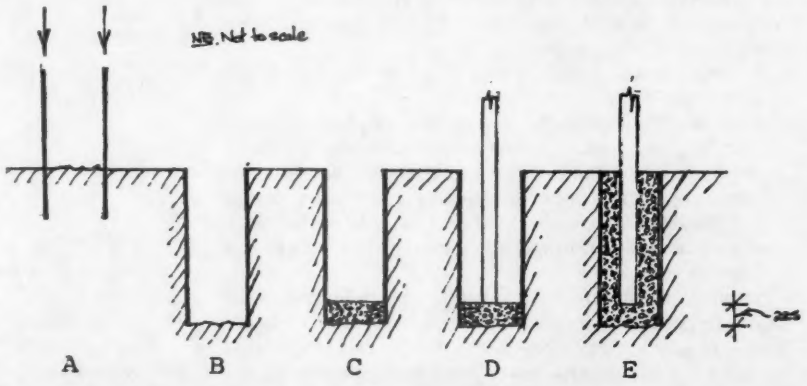


Fig. 1. Drum foundation construction

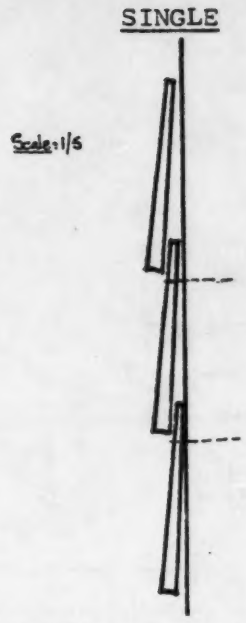


Fig. 2. Nailing feather edged boarding

oped the "drum foundation," an inexpensive stanchion base. The top and bottom of a 45-gallon (imperial) oil drum are removed, leaving a metal cylinder which is driven into the ground in the desired position. Once the top is flush with ground level, the inside soil is excavated and a 225 mm (9 in) bed of concrete poured. The stanchion is then positioned in the drum and restrained, while the rest of the cylinder is filled to ground level with concrete (Fig. 1).

Cladding siding may be prefabricated off-site in modular panels, but this is only practical where truck access to the site is available. In many cases, this will not be possible so man-handling the panels is the only alternative; not very welcome if the distance is long and through an inhospitable habitat. Therefore, it may be easier to carry individual items of cladding, along with the rest of the structure, to the site. It should be noted that subframes will not be required where the cladding panels have been prefabricated, as these will have their own subframe and strengtheners. Therefore drawing LS/2 shows examples where the cladding is to be fixed 'on the spot' (Fig. 2).

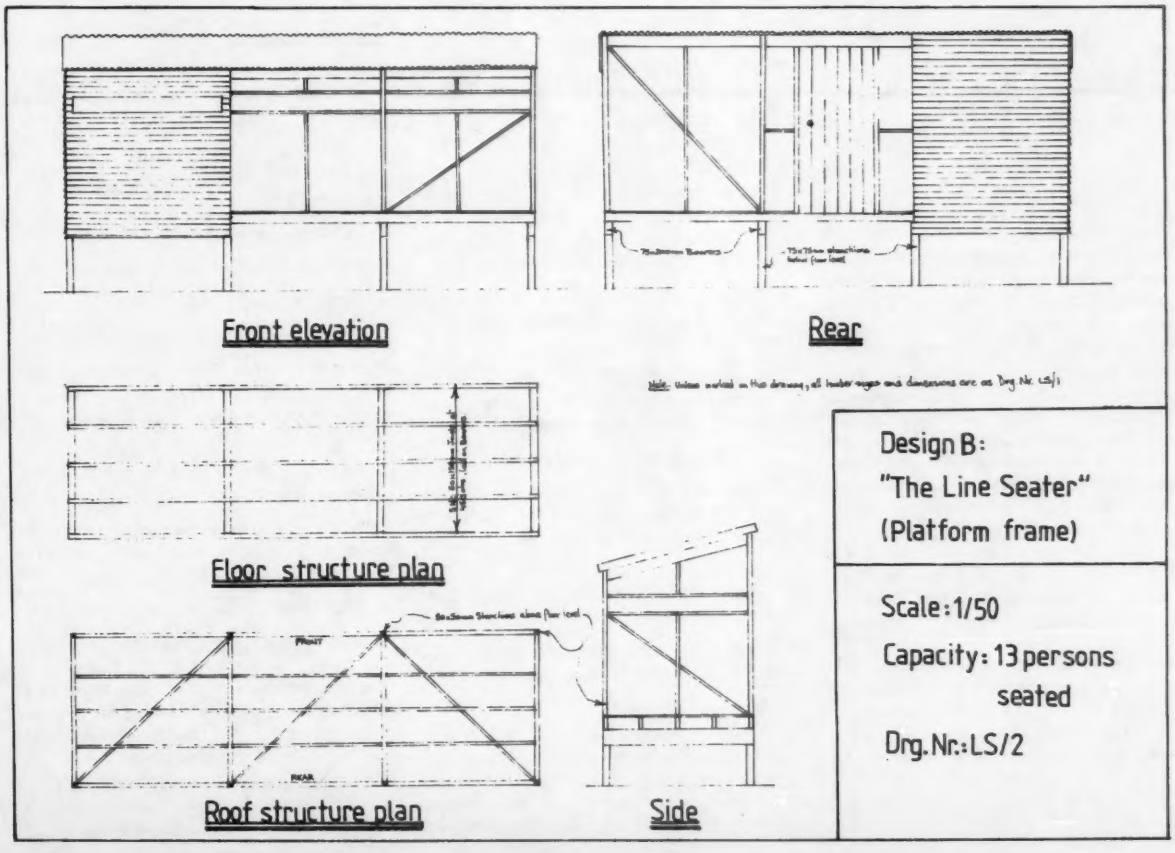
A lining of plywood nailed to the frame interior, particularly on the end modules, will add strength and rigidity to the hide, especially where it will have high exposure to wind.

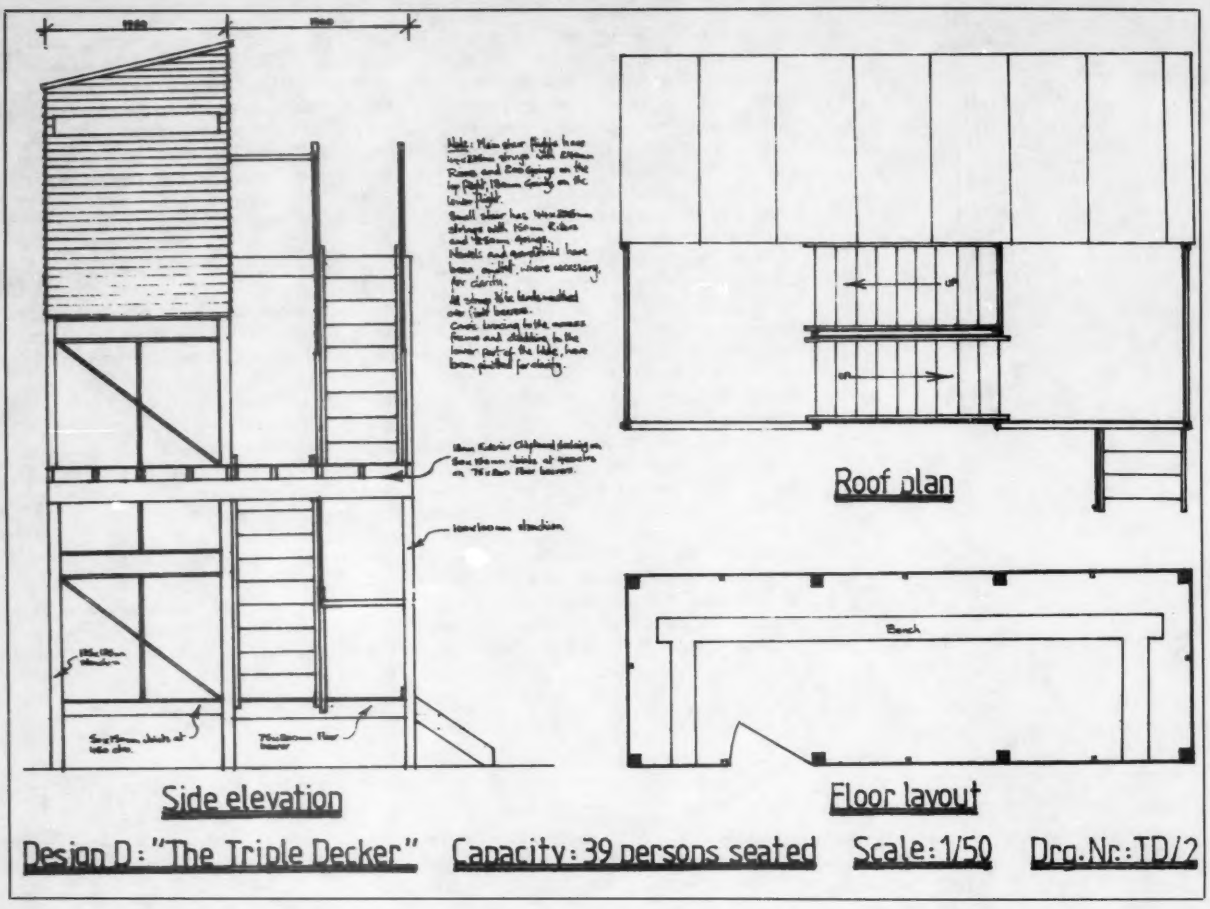
Design

This is an important aspect in reaching a decision as to (1) whether or not a hide is necessary or viable and if so (2) which type or configuration of hide to choose. If the basic module is used, a hide may consist of any number arranged in any configuration, vertical or horizontal, with the proviso that it should not be higher than three storeys. Tall hides present problems of stability in windy conditions, difficulty of integration, and require scaffolding for attaching upper floors and cladding boards (TD/2).

Horizontal modules may be used in any configuration to suit the proposed site, remembering that all module faces should be flush and in a line so as to provide unhindered views. The most complex horizontal use is that of angled faces as in drawing number PMC/1, but it should be noted that horizontal and vertical can be used in combination for the same hide if desired; the combinations are innumerable.

A hide should be sited overlooking a lake, pond, lagoon or other area of interest where wildlife regularly congregate to feed, etc. If such a feature is not readily available, it may be possible to make your own with a little ingenuity and knowledge of what type of habitat is required to lure the different species. The





orientation of the hide should be facing north in the Northern Hemisphere and south for the Southern half, in order to negate direct sunlight through the observation slits.

Integration of the hide and its access trail is just as important as selection of the most suitable design. Integration is the art of hiding the structure effectively among the surroundings without obscuring the view from the observation slits. Each site will offer unique integration opportunities and may even involve planting around the hide or its approach in order to blend it in with the surroundings. The hide's immediate rear approach should be completely screened from the overlook, in order to permit access without alarming the wildlife. Existing opportunities can only be fully ascertained by the "man-on-the-spot," and often the integration possibilities dictate where the hide will be, its orientation and eventual design. Thus, this aspect should become a tool of the design itself.

Guidelines on the choice and design of a hide

The decision as to whether or not build a hide is based upon a number of criteria. These are set out below in an order which allows decisions to be made with the least amount of expense.

Is the hide necessary?

1. Is it necessary to group visitors to prevent damage to the habitat?

2. Is the proposed site of the hide within 150m of where the subject to be observed congregates? (At distances over 150m (500f), a hide would not usually be necessary in that most species will allow approach closer than this).

If 'No' is the answer to *either* of the above, then a hide is unnecessary and need not be further considered.

Is the hide a viable proposition?

1. Is there an area within view of the proposed site where wildlife congregate regularly?

2. Are there enough finances available?

3. Is there enough space available for the number required to be accommodated (each module seats 3 and covers an area of 3.10m² or 33.35f²)?

4. Is there a good chance to integrate the hide effectively?

If the answer is "No" to any of the above, then a hide is neither viable nor necessary.

What options are open?

1. What is the nature of the feature the hide is to overlook? (Some hides are not suitable for certain sites: the poor man's circle, drawing number PMC/1, would not suit a site requiring views from one side only. This hide would be better off on a headland or on the end of a sandspit. Generally, the most versatile design is the line seater type).

2. What space is available?

3. How many persons need to be seated?

4. What financing is available?

5. What integration opportunities exist?

6. Is it necessary to elevate the hide? (This may be required due to susceptibility to flooding, or merely to see over some object such as an embankment).

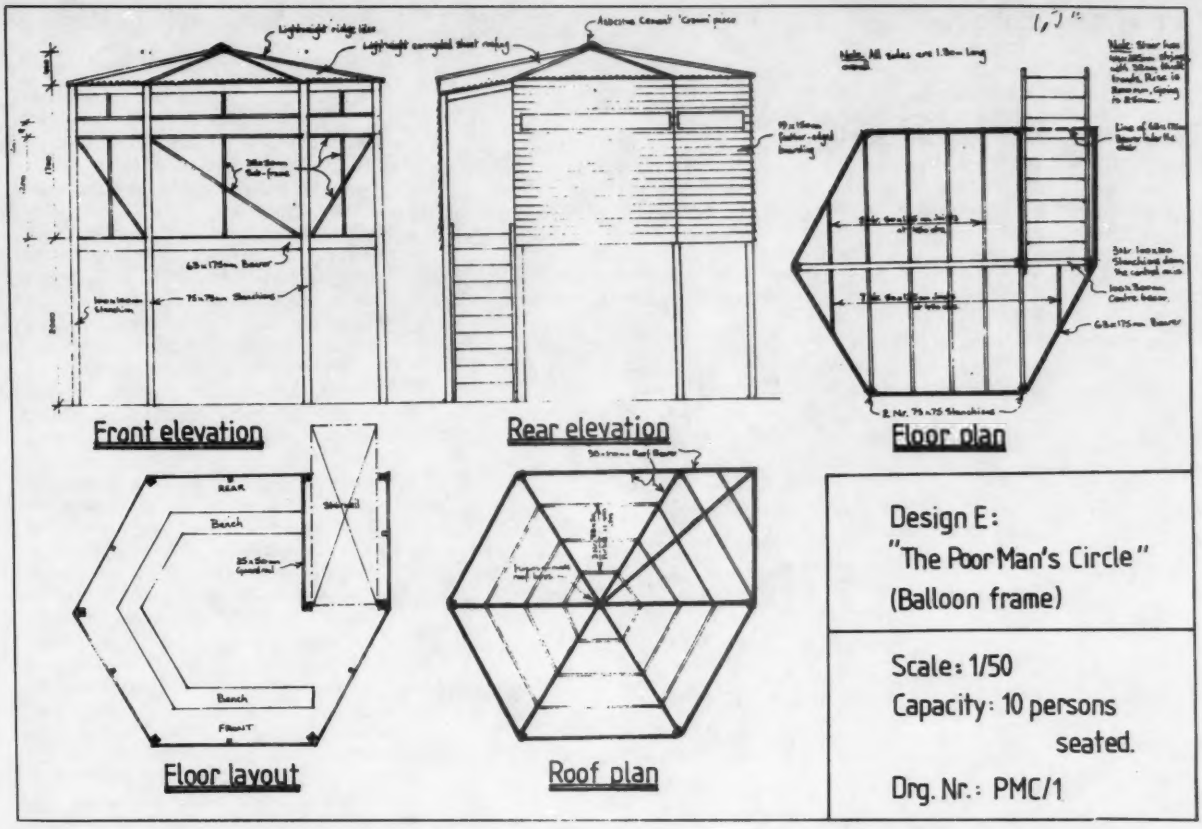
7. Of what type and how long will the access trail need to be?

8. Will a drum foundation be adequate or will a more complex and therefore more expensive foundation be needed?

9. Will vehicle parking need to be provided?

Answers to the above will leave the prospective hide builder with a number of solutions. It is then up to him to choose the best available solution from the alternatives, basing his decision on his knowledge of the reserve or park, materials on hand, and available funds.

Malcolm Fisher is a member of RSPB. This material is extracted from his final thesis for honours degree in Quantity Engineering, Portsmouth Polytechnic, England.



Portable Barbeques

Barbecues in the metropolitan park reservations in Melbourne, Australia, have traditionally been large, cumbersome and inflexible objects. Mr. Roy De Campo, a welder at Maribyrnong Valley Metropolitan Park in Melbourne, designed an innovative portable barbecue which has proved extremely popular.

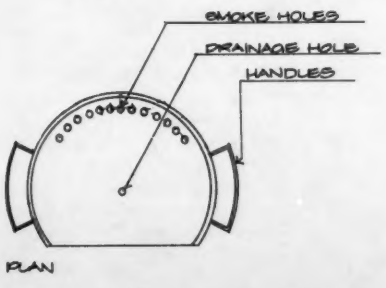
The barbecue stands approximately 80 cm from the ground, with a cooking plate of about 50 cm in diameter. Handles are situated on both sides of the fire-box for easy maneuverability in carrying the device from one location to another.

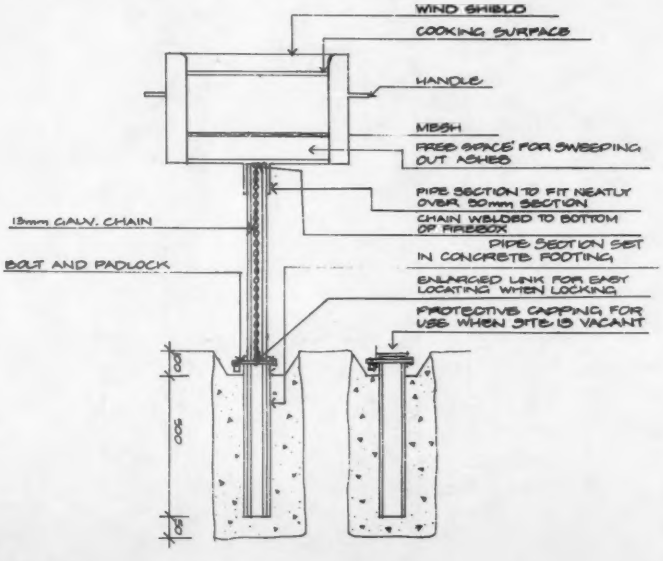
The pipe section fits neatly over a 5 cm section and has a 13mm galvanized chain in the middle of the pipe. This pipe section is welded to the bottom of the fire-box and padlocked to a ground section which is set in a concrete footing. When the barbecue is moved, a protective capping is available to cover the concrete footing.

The barbecue looks attractive when installed and requires very little maintenance. Probably one of the greatest advantages of this prototype is that popular sections of a park can be spelled from heavy use, as the barbecue can be moved to different locations, or stored when not needed. Additionally, the barbecue has proven to be strong and sturdy, and relatively vandal-proof.

Our thanks to G. L. Clarke, Acting Assistant Secretary of the Melbourne and Metropolitan Board of Works for sharing this design with our readers.

Reprinted from Design, *Fall 1983, a publication of the US National Park Service and the National Recreation and Park Association.*



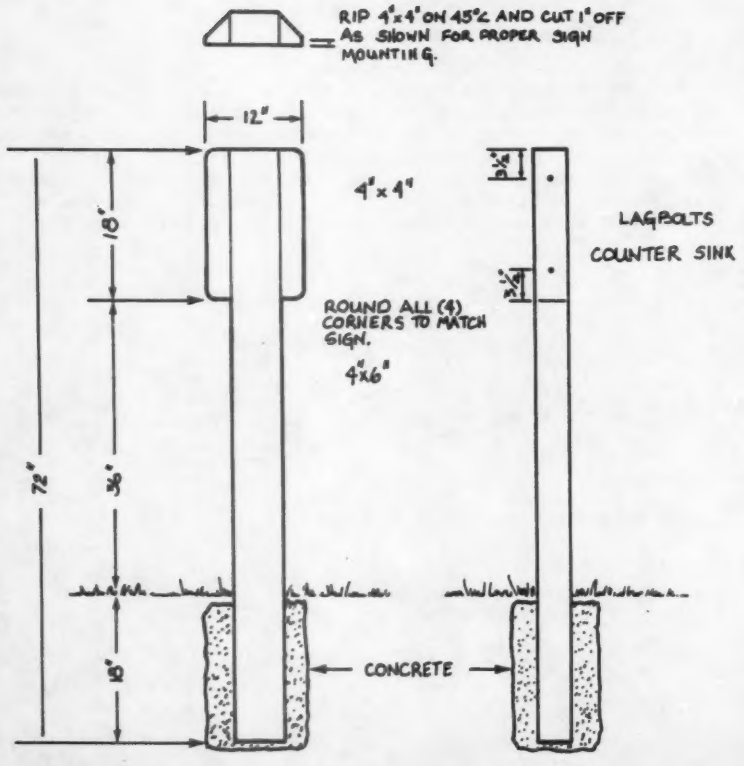

WIND SHIELD
COOKING SURFACE
HANDLE
MESH
FREE SPACE FOR SWEEPING OUT ASHES
PIPE SECTION TO FIT NEATLY OVER 50mm SECTION
CHAIN WELDED TO BOTTOM OF FIREBOX
PIPE SECTION SET IN CONCRETE FOOTING
ENLARGED LINK FOR EASY LOCATING WHEN LOCKING
PROTECTIVE CAPPING FOR USE WHEN SITE IS VACANT
13mm GALV. CHAIN
BOLT AND PADLOCK
600

Practical Road Sign

John Calvert of the Ellisville, Missouri (US) Parks and Recreation Department shares his plans for this simple, aesthetically pleasing sign designed for easy assembly and installation.

Once installed, the treated post material is virtually maintenance free. With the aluminum signing being completely backed by the wooden post, it makes vandalism by bending of the sign very difficult.

(Reprinted from GRIST, *Spring, 1984, a publication of the U.S. National Park Service and the National Recreation and Park Association.)*



Setting Wooden Sign Posts

The typical sign setting method is to dig a hole with post hole diggers, drop a sign post into the hole, and fill the remainder of the hole with dirt. This results in an unsatisfactory installation that is easily disturbed by theft, vandalism or even casual visitor.

For example, signs have easily been damaged by simply pulling them out manually, and tossing them on the ground; they've been found leaning to one side after vandals have rocked the post back and forth in the hole; and sometimes signs were deliberately rotated in place to misdirect trail users. Also, natural forces have caused signs which were installed by the typical method to lean or fall over due to the soil composition, hole depth, sign weight and/or sign height.

Stephen S. Hale, US Forest Service, recommended a technique for setting sign posts which significantly reduces vandalism and theft of signs. This technique utilizes a unique combination of angled nails and a rock collar just below ground level that can produce an installation as solid as if concrete were used.

The equipment required is simple, minimal, and easily transported, even down a trail away from a vehicle: post hole diggers, tamping bar, large 6" galvanized nails, hammer, heavy wheel bearing grease, trowel and handsaw. Hammer at least four nails spaced evenly apart around the post and angle them upward at about a 30° angle. The angle of the nails and the rocks tamped down over them will counteract attempts to pull the post out. (Prior to remote sign installations, the post length can be precut with the saw and the nails hammered into the post to eliminate having to carry the hammer.)

This technique has been successfully implemented in the US Forest Service for approximately two years and is particularly suited for field installations since it requires a minimum of equipment and personnel and utilizes native materials. Monetary savings have already been realized due to reduced field maintenance costs and reduced sign replacement costs since it deters would-be vandals.

(1) Use post hole diggers to dig hole wide enough to drop post w/nails down into (2 foot minimum depth, increase proportional to weight and height of sign).

(2) Place stone in bottom of hole to set post onto.

(3) Fill and tamp soil to level of or just above nails.

(4) Tamp 4 inch diameter rocks on top of nails (at least four 6 inch galvanized nails spaced evenly around the post *angled* upward at a 30° foot angle).

(5) Fill and tamp 1 inch of soil on top of rocks and into cracks between the rocks.

(6) Fill and tamp soil to within 6 inches of ground level.

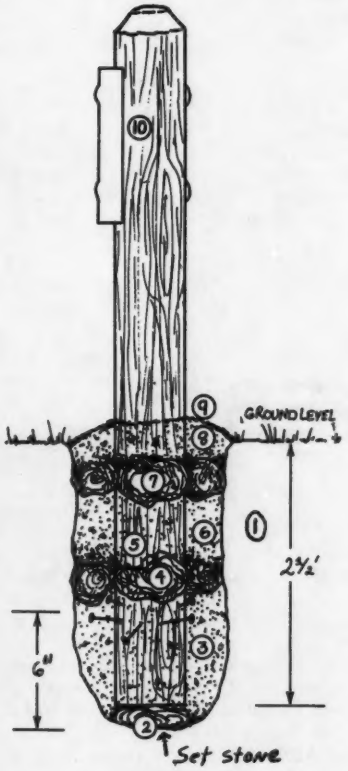
(7) Select native rocks that are slightly larger than the space between the side of the hole and the post. Place each rock individually, leaning it against post and

tamp highest point so that rock firmly wedges in place. By placing and tamping them side to side, a tight rock collar will be formed that holds the post securely in place.

(8) Fill and tamp soil to ground level.

(9) Fill soil loosely around base of post and pack with foot.

(10) Grease edges and back of sign board, back of sign post down to ground level, top of post if an untreated surface is exposed, and the back ends of the mounting bolts.

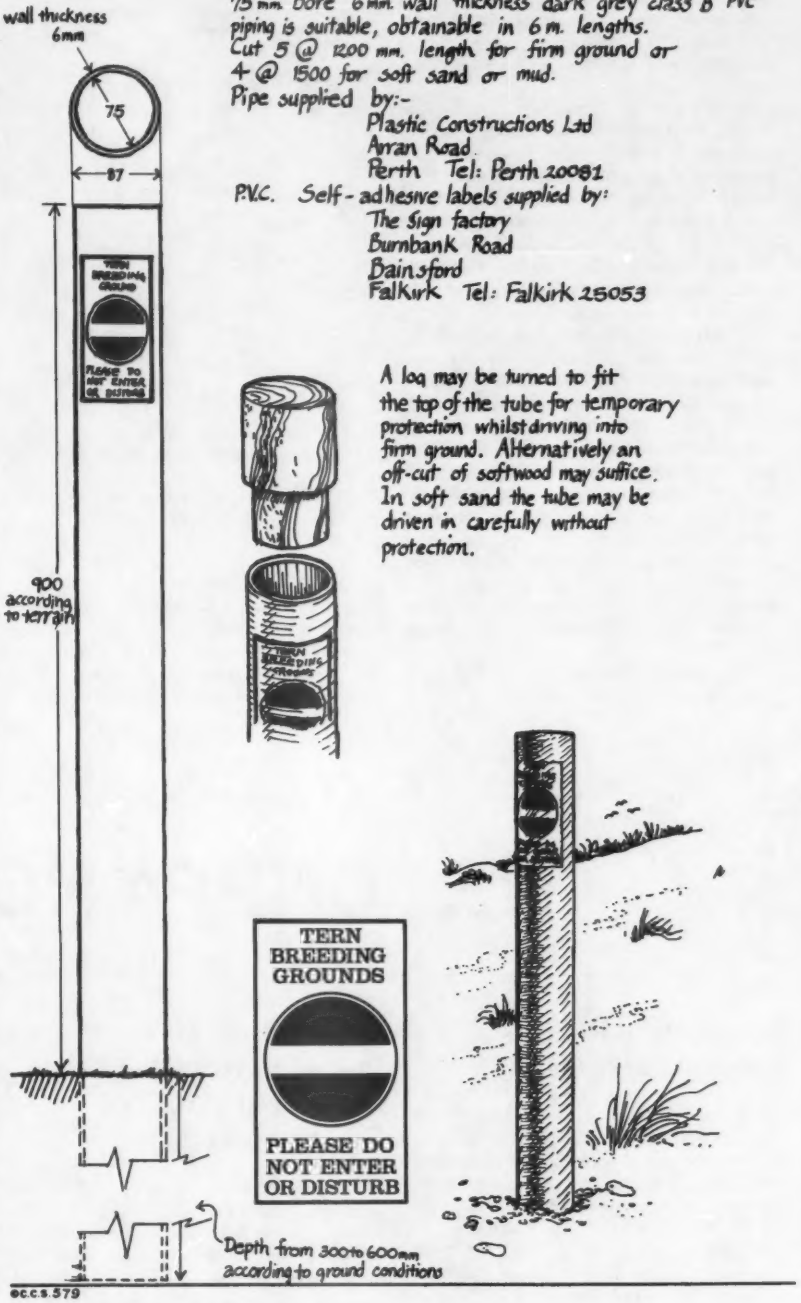


(Reprinted from GRIST, *Spring 1984, a publication of the U.S. National Park Service and the National Recreation and Park Association.)*

RESERVE BOUNDARY MARKER

scale 1:5

Lengths of lightweight plastic pipe with printed self adhesive PVC labels are an effective method of delineating temporary boundaries at critical times of the year, such as during the tern breeding season on a reserve.
75 mm. bore 6 mm. wall thickness dark grey class B PVC piping is suitable, obtainable in 6 m. lengths.
Cut 5 @ 1200 mm. length for firm ground or 4 @ 1500 for soft sand or mud.
Pipe supplied by:-
Plastic Constructions Ltd
Arran Road
Perth Tel: Perth 20081
P.V.C. Self-adhesive labels supplied by:
The Sign factory
Burnbank Road
Bainsford
Falkirk Tel: Falkirk 25053


wall thickness 6mm
75
87
TERN BREEDING GROUND
PLEASE DO NOT ENTER OR DISTURB
900 according to terrain
A log may be turned to fit the top of the tube for temporary protection whilst driving into firm ground. Alternatively an off-cut of softwood may suffice. In soft sand the tube may be driven in carefully without protection.
TERN BREEDING GROUNDS
PLEASE DO NOT ENTER OR DISTURB
Depth from 300 to 600mm according to ground conditions
©C.C.S. 579

Information Sheet from the Countryside Commission for Scotland

Constructing a Water Supply

Most backcountry water sources require some kind of improvement to help protect water quality. This may be as simple as placing a few stepping stones in a small brook, or building a stone or wood cistern. When wood is desired, use a rot-resistant species like tamarack, cedar, or redwood. In any case, the goal is to make the water source more accessible while at the same time protecting its purity. The following are a few techniques that have been used successfully:

(1) Often, a stream bank erodes or turns to mud under frequent use. An area immediately surrounding a stream is sometimes very wet and marshy — a quagmire frequently results. Two ways to avoid this undesirable condition are to use rock and make a cobblestone path and/or platform to dip from, or to use a low, wood puncheon to create a dry walkway. The steep, eroded stream bank can be shored up with either rock or wood steps.

(2) Constructing a small collection pool or cistern comes next. However, with only one pool, the danger exists that some misguided camper will wash dishes or himself in it, polluting the water supply until the pool completely replenishes itself. One solution is to build a series of cisterns in which water spills from one to the next. The lowest pool serves as the primary water source. If that pool is somehow polluted temporarily, then the upper pools may be used immediately. This approach has proved especially valuable where springs often flow to a trickle during the driest summer weeks, and complete replenishing can take many hours (Fig. 1,2).

(3) Another technique for ensuring good water quality is to draw water from a source rarely, if ever, visited by people. This can be done by running a length of plastic or metal pipe from an uphill water source to a convenient drawing point. The longer the pipe and steeper the grade, the greater the water pressure. A screen fastened over the intake end of the pipe will prevent clogging by sediment or debris (Fig. 2).

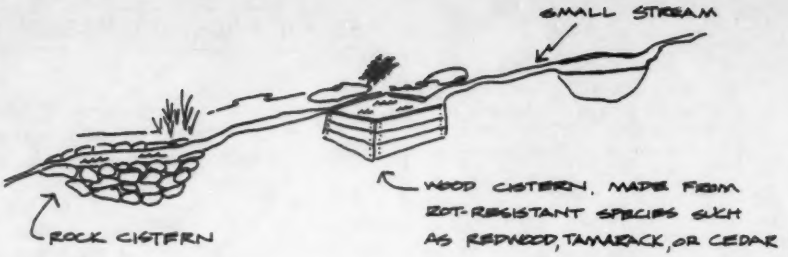


Fig. 1. A three-pool system for water supply. Lowest pool is primary water source. Upper pools used when lowest pool is temporarily polluted.

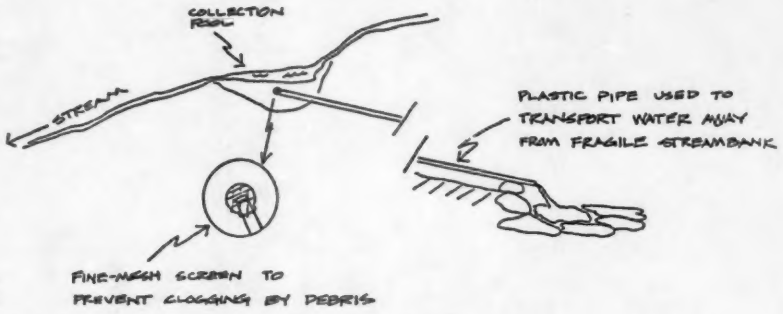

COLLECTION POOL
STREAM
PLASTIC PIPE USED TO TRANSPORT WATER AWAY FROM FRAGILE STREAMBANK
FINE-MESH SCREEN TO PREVENT CLOGGING BY DEBRIS

Fig. 2. A piping system for water supply. This method keeps the water source away from human use and so protects it. A one-inch pipe is usually good.

(Reprinted from Guidelines for Constructing Overnight Backcountry Facilities *by Stephen K. Rice and Stephen C. Fay, USDA Forest Service, Durham, NH, USA)*

IUCN Commission on National Parks and Protected Areas

CNPPA NOTES

New Zealand Releases National Parks Policy

The National Parks and Reserves Authority for New Zealand has recently issued an 88 page statement of general policy for national parks. The policy itself is a result of a long public participation process and includes guidelines for almost all aspects of park management in New Zealand. This includes the contentious issue of recreational hunting which is allowed in several of New Zealand's national parks. Further enquiries can be made by writing to the Department of Lands and Survey, Box 2593, Wellington.

World's Most Threatened Protected Areas Will Be Announced at IUCN General Assembly

As outlined in the last issue of PARKS, the process has begun for determining and reporting on the most threatened protected areas of the world. On the basis of information from members and literature sources, a total of 35 areas have been tentatively identified and will be considered for the final list of ten. The list on the following pages provides a brief description of the threats and the nature of documentation we have received to date. CNPPA member comments are very welcome on this issue and should be sent as soon as possible to the Executive Officer. For further information on the criteria for the list please refer to the previous issue.

These nominations will be selected and announced at the IUCN General Assembly in Spain in November. The selection of the final 10 sites involves the following screening process: (1) all CNPPA realm vice chairmen will rate the most threatened areas in their respective realms; following which (2) a final selection panel consisting of the CNPPA Chairman, Executive Officer and several secretariat staff will compile a final list.

The following nominations for the list, as of June, 1984:

Site	Location	Threats	Documentation
Africa			
1. Garamba NP	Zaire	Poaching to extinction	Prepared for World Heritage
2. Djoudj NP	Senegal	Radical change in water regime	Prepared for World Heritage
3. Ngorongoro CA	Tanzania	Inadequate management resources	Prepared for World Heritage
4. Tai NP	Ivory Coast	Illegal settlement, mining, poaching	Adequate
5. Lochinvar and Blue Lagoon NP	Zambia	Commercial fishing, gypsum mine, military occupation, livestock, and effects of Kafue dam	More requested
6. Mkomazi GR	Tanzania	Takeover by pastoralists, poaching (6 species extirpations (sic))	Adequate
7. Boma NP	Sudan	Abandonment by staff due to rebel forces	More required
8. Ouadi Rime/Achim	Chad	Civil unrest	No report
9. Central Kalahari Game Reserve	Botswana	Livestock fences, pesticide spraying	In process
10. Gorongosa NP	Mozambique	Military activities, abandonment by staff	Requested
11. Mt. Nimba SNR	Ivory Coast	Poaching, illegal timber removal, lack of enforcement	Adequate
Asia/Pacific			
1. Mt. Apo NP	Philippines	Human settlement, removal of vegetation, declassification	Adequate
2. Kutai NP	Indonesia	Forest fire, illegal logging	More required
3. Klais NP	Sabah-Malaysia	Degazettement	Some
4. Manas Tiger Reserve	India/Bhutan	Dam construction in Bhutan	More required
5. Gir NP	India	Dam, livestock	*Env.Cons.* 10(4)
6. Cape Tribulation NP	Australia	Road construction	Adequate
7. Silent Valley	India	Hydro development	*Biol. Cons.* 29(3) and others
8. Thung Yai	Thailand	Nam Choan hydro dam	Environmental Impact
Europe			
1. Durmitor NP	Yugoslavia	Upstream pollution	Not available
2. Pyrenees NP	France	Hydro and road development	Not available
3. Tatra NP	Czechoslovakia	Acid rain pollution	Not available
4. Stelvio NP	Italy	Regionalization	Some
5. Cevennes NP	France	Ski resort development, unrestricted hunting	Some
6. Vanoise NP	France	Hydro development	Some
7. Ecrins NP	France	Hydro development, hunting, livestock grazing	Some
Latin America			
1. La Amistad	Costa Rica	Pipeline and road construction	Requested
2. Darien NP	Panama	Road construction	Requested
3. Araguaia NP	Brazil	Road construction	Not available
4. Manu NP	Peru	Roads, settlement, prospecting, canal construction	In process
5. Kaieteur NP	Guyana	Closure by military for private hunting	Requested
6. The entire NP system	Bolivia	Lack of funds, equipment, management presence and enforcement	Some
North America			
1. St. Matthew Refuge	USA	Oil exploration and development	*Oryx* 18 (2)
2. Wrangell/St. Elias	USA	Downgrade of status to allow hunting	More required
3. Cuyahoga NRA or Indiana Dunes DL	USA	Acid rain pollution	*Env. Cons.* 10(4)
4. Wood Buffalo NP	Canada	Hydro dam proposal	Various sources
5. Pennekamp Coral Reef State Park	USA	Condominium Development	Adequate

BOOKS AND NOTICES

New National Parks in India

The Government of Manipur has declared 18 square miles of Sirohi Hill Range in Manipur East District on the borders of Upper Burma as Sirohi National Park under the provisions of the Wildlife (Protection) Amendment Act, 1982.

The objective for creation of this Park is to maintain biosphere reserve for conservation of the unique eco-system along with component plants, animals and micro organisms etc., to safeguard the genetic materials that make up the biosphere and to allow the natural evolutionary process in the region.

The Namdapha Wildlife Sanctuary near Miao in Tirap district has been declared a National Park by the Arunachal Pradesh Government, according to a notification issued recently.

Namdapha was brought under Project Tiger last year by the Indian Board for Wild Life, of which the Prime Minister is the Chairperson.

Namdapha Sanctuary, spread over nearly 1,800 km², holds rich flora and fauna. According to the latest census, its tiger population is 29.

(Reprinted from the World Wildlife Fund-India Newsletter.)

Sanctuaries for Lesser Floricans

The Madhya Pradesh Government of India has set up two sanctuaries to protect the near-extinct lesser florican, a bird locally known as "Kharmor."

According to the State Forest Department, adequate arrangements had been made to protect the eggs of lesser floricans in the Sardarpur and Silama sanctuaries which cover about 350 and 1,000 hectares of land respectively.

The lesser florican *(Sypheotides indica)* is an elegant bird and lays eggs in the rainy season. Sandy buff with blackish streaks, the bird has upwardly curled head plumes. Its legs are long and the flight is like that of the great Indian bustard, but more rapid.

Some lesser floricans are also found in Rajasthan. Their existence in western Madhya Pradesh was confirmed by the noted ornithologist Dr. Salim Ali.

Information Needed on Protection of Excavated Archaeological Sites

ICCROM (International Centre for the Study of Preservation and Restoration of Cultural Property) is collecting information on methods of site protection after excavation. Methods of interest include backfilling, temporary protection (e.g. sheeting, temporary shelters), and long-term protection (e.g. consolidation, roofing, security and access for visitors). If there is sufficient interest, a newsletter will be published in order to exchange information on current activities in site protection, relevant literature and practical experiences in the field. Details from:

N. P. Stanley Price
ICCROM
Via di San Michele 13
00153 Rome, Italy

Wilderness Research Conference

A National Wilderness Research Conference will be held at Colorado State University July 23-26, 1985. Sponsored by the Colorado State University, this interdisciplinary meeting will integrate and interpret what has been learned by the scientific community related to wilderness resource and its human uses. Topical areas include air, water, vegetation and soils, fish and wildlife, fire, use and user characteristics, wilderness benefits, visitor attitudes, and visitor management concepts and tools. For more information contact:

National Wilderness Research Conference
College of Forestry & Natural Resources
Colorado State University
Fort Collins, Colorado 80523, USA

Marine Animals and Parks Symposium

A Symposium on Endangered Marine Animals and Marine Parks will be held in Cochin, India, January 12-16, 1985, sponsored by the Marine Biological Association of India.

The focus of the meeting is conservation, management and habitat protection in the form of biosphere reserves, national parks or sanctuaries for the endangered or vulunerable marine animals.

The symposium is open to individuals and organizations. Further information can be obtained from:

Convener, Symposium on Endangered Marine Animals and Marine Parks
Marine Biological Association of India
Post Box 1244, Ernakulam
Cochin 682011, Kerala, India

Correction

Several sharp-eyed readers pointed out the erroneous captions of the pictures accompanying the article on Akagara National Park in Rwanda. volume 8, number 4. On page 7 the caption should have read "A herd of eland *(Taurotragus oryx)*." The animals showed on page 8 are cape buffalo *(Syncerus caffer)*. The editor apologizes for any confusion the captions may have caused; they were not the fault of the authors.

A field trip to the Doñana National Park in Spain's coastal region will be one feature of the IUCN General Assembly. Unstable sand dunes such as these, a major part of Doñana's ecosystem, are constantly shifting, overtaking the pine/juniper groves (corrales) common to the area. These groves are killed, but new ones re-establish on the back side of the advancing sands. Other ecosystems found in the Park include coastal areas with stable dunes, marsh wetlands, pine groves, oak groves and chapparal. Photo: Larry Mason, US Fish & Wildlife Service.

Back cover: A virgin deciduous forest in Bialowieski National Park, Poland, in the autumn. Honey mushrooms cluster thickly on the trunk of a broken hornbeam tree, Photo: Czesław Okołów

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